

1. (4 points) Identify the domain of the following functions:

(a) (2 points) $g(t) = \sqrt{3t - 2}$.

(b) (2 points) $f(x) = \frac{4x}{2^x - 1}$.

2. (4 points) Sunspot intensity fluctuates over an 11-year cycle. The average radiance of the sun is 1366 watts per square meter, and the sunspot cycle causes variance around this average of ± 0.75 watts per square meter. Create a function $f(t)$ which would serve to model the sun's radiance over time, with t being measured in years (you need not worry about phase shift).

3. **(4 points)** If $f(x) = x^2 - x$, evaluate and simplify the expression $\frac{f(2+h)-f(2)}{h}$.
4. **(8 points)** Variola Modo is breeding a new species of bacterium whose population doubles every 10 minutes. He starts with a sample of 40 bacteria.
- (a) **(4 points)** Construct a function $f(t)$ to describe the bacteria's population after t minutes.
- (b) **(4 points)** Use your function to determine the number of minutes it will take for the population to reach 800 bacteria. Your answer should be in the simplest calculatable form.
5. **(1 point bonus)** Explain why, for any odd functions $f(x)$ and $g(x)$, the function $h(x) = f(x) \cdot g(x)$ must always be even.